

HAYEK ET AL.  
"RF Receivers And Methods"  
Aity. Docket No. CS11336

Appl. No. 09/998,489  
Examiner R. Perez Gutierrez  
Art Unit 2683

## REMARKS

### Request for Reconsideration, Informal Matters, Claims Pending

5                   The Official action mailed on 13 March 2003 has been considered carefully. Reconsideration of the claimed invention in view of the amendments above and the discussion below is respectfully requested.

10                   The Applicants respectfully decline to adopt all of the informal claim amendments recommended by the Examiner. The proposed changes are indicative of the Examiner's personal idiomatic preferences, though not required to comply with 35 USC 112, 2<sup>nd</sup> paragraph. Claims 2, 12 and 17 have been amended according to the idiomatic preferences of the Applicants. Claim 23 was amended to provide clearer antecedents.

15                   Claims 1-10 stand allowed. Claims 12 stands objected to for dependence on a rejected base or intervening claim. Claims 11-23 stand rejected.

                  New Claims 24 and 25 have been added for consideration by the Examiner. No new matter has been added.

20                   Claims 1-25 are pending.

### Allowability of Claims 11-19 & 24 Over Atkinson & Freed

### Rejection Summary For Claim 11

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Independent Claim 11 stands rejected Under 35 USC 102(e) as being anticipated by US Patent Appl. Pub. No. 2001/0039182 (Atkinson). The Examiner alleges specifically that Atkinson discloses

5 ... providing a local oscillator signal 24 (mixer injection frequency) (figure 2) by dividing a voltage controlled oscillator (VCO) 38 output by a frequency divide ratio (figure 2 and page 2 paragraphs 0018 and 0019),  
10 the VCO 38 having a frequency F3 outside a bandwidth of received signal harmonics (figure 2 and page 2 paragraph 0020).

Argument Supporting Patentability of Independent Claim 11

15 Regarding Claim 11, contrary to the Examiner's assertion, Atkinson fails to disclose or suggest a method in a receiver, comprising:

20 ... providing a mixer injection frequency by dividing a voltage controlled oscillator output by a frequency divide ratio, the voltage controlled oscillator having a frequency outside a bandwidth of received signal harmonics.

Atkinson discloses at para. 0020, referenced by the Examiner, that

25 ... [t]he frequency of the  $F_3$  of the signal from the voltage controlled oscillator is ... not harmonically related ... to the frequency of the in RF signal ... because the frequency of the input RF signal is equal to  $\frac{4}{3} F_3$ .

30 The Examiner's implied contention that an oscillator frequency, i.e., the VCO 38 frequency F3 of Atkinson, not harmonically related to the input RF signal is also outside a bandwidth of the input RF signal harmonics is

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incorrect. An oscillator frequency that is not harmonically related to the input RF signal may be within, or inside, the bandwidth of the input RF signal harmonics. Atkinson does not distinguish between a VCO having a frequency that is within or without the bandwidth of the received signal harmonics.  
5 Atkinson merely states that the frequency of the VCO is "... not harmonically related ... to the frequency of the input RF signal." Thus Atkinson does not disclose a method in intermediate frequency and direct conversion receivers comprising

10 ... providing a mixer injection frequency by dividing a voltage controlled oscillator output by a frequency divide ratio, the voltage controlled oscillator having a frequency outside a bandwidth of received signal harmonics.

15 Claims 11 and dependent Claims 12-18 are thus patentably distinguished over Atkinson and in condition for allowance.

Argument Supporting Patentability of Independent Claim 12

20 Claim 12, which the Examiner objected to but indicated was allowable, is in condition for allowance based on the allowability of base Claim 11, as discussed above.

Rejection Summary For Claims 13, 14 & 18

25 Claims 13, 14 and 18 stand rejected as being unpatentable over Atkinson under 35 USC 103. The Examiner contends that it would have been obvious to

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5                   ... modify the teaching of Atkinson to specifically select a frequency divide ratio greater or equal to one that would have maintained the local oscillator frequency outside the bandwidth of harmonics or fundamental frequency of the received signal in order to prevent leakage of the local oscillator frequency.

Argument Supporting Patentability of Claims 13, 14 & 18

10                   Regarding Claim 13, contrary to the Examiner's assertion, Atkinson does not disclose or suggest that

15                   ... the frequency divide ratio is  $q = 1$ , mixing the received signal at a mixer injection frequency outside a bandwidth of a fundamental frequency of the received signal

20                   In combination with the limitations of Claim 1. According to Atkinson, at para. 0020, "... [t]he frequency of the  $F_3$  of the signal from the voltage controlled oscillator is ... not harmonically related ... to the frequency of the in RF signal ... because the frequency of the input RF signal is equal to  $\frac{4}{3} F_3$ ." If the divide ratio = 1, in Atkinson, the VCO 38 frequency  $F_3$  would be equal to the frequency of the input RF signal, contrary to the teaching of Atkinson. Thus Atkinson does not suggest that the "... frequency divide ratio  $q=1$  ..." as in Claim 13. Claim 13 is thus patentably distinguished over Atkinson.

25                   Regarding Claim 14, contrary to the Examiner's assertion, the frequency divide ratio in Atkinson is  $< 1$ , since Atkinson multiples the VCO frequency  $F_3$  by  $\frac{4}{3}$ . Additionally, Atkinson does not disclose or suggest "... mixing the received signal at a mixer injection frequency derived from a VCO frequency that is outside a bandwidth of the  $n^{\text{th}}$  harmonic of the received signal, where the frequency divide ratio  $q$  equals the harmonic number  $n$ " as  
30                   recited in Claim 14. The Examiner's action does not expressly address the

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limitations of Claim 14. Claim 14 is thus patentably distinguished over Atkinson and in condition for allowance.

Regarding Claim 18, contrary to the Examiner's assertion, Atkinson fails to disclose or suggest "... mixing the received signal at a mixer injection frequency outside a channel bandwidth of the received signal." As noted, Atkinson merely provides a VCO frequency that is not harmonically related to the frequency of the input RF signal, without regard to whether or not the mixer injection frequency is outside the bandwidth or outside the channel bandwidth of the received signal. Claim 18 is thus patentably distinguished over Atkinson.

#### Argument Supporting Patentability of New Claim 24

Atkinson fails to disclose or suggest a method in intermediate frequency and direct conversion receivers, comprising:

... providing a mixer injection frequency at a frequency different than the receive frequency by dividing a voltage controlled oscillator output by a frequency divide ratio, the voltage controlled oscillator having a frequency outside a bandwidth of received signal harmonics.

In Atkinson, the mixer injection frequency (34) the same as the received signal frequency. Atkinson, para. 0019. And, as noted above, Atkinson fails to disclose or suggest a "... voltage controlled oscillator having a frequency outside a bandwidth of received signal harmonics." New Claim 24 is thus patentably distinguished over the art.

#### Rejection Summary for Claims 15-17

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Claims 15-17 stand rejected under 35 USC 103 as being unpatentable over Atkinson in view of US Patent No. 6,487,419 (Freed). The Examiner concedes that Atkinson fails to disclose "... determining the signal strength and bit error rate of the received signal and increasing a gain of the received signal before mixing if the gain of the signal received signal is below a gain threshold" but asserts that these actions would have been made obvious in light of the teaching of Freed "... in order to efficiently manage the power consumption of the wireless device."

Argument Supporting Patentability of Claims 15-17

Regarding Claim 15, Atkinson does not suggest

... determining a condition of the received signal;  
mixing the received signal at the mixer injection frequency derived from a VCO frequency that is outside the bandwidth of the harmonics of the received signal only if the condition of the received signal is above a threshold.

Contrary to the Examiner's assertion, neither Atkinson nor Freed disclose or suggest conditional mixing. The Examiner's action does not specifically address the conditional limitation of Claim 15. Claim 15 is thus patentably distinguished over Atkinson and Freed.

Regarding Claim 16, neither Atkinson nor Freed disclose or suggest "... determining the condition of the received signal by determining a strength thereof" in combination with the limitations of Claim 11. Claim 16 is thus patentably distinguished over Atkinson and Freed.

Regarding Claim 17, neither Atkinson nor Freed disclose or suggest "... determining the condition of the received signal by determining a

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signal strength and bit error rate (BER) thereof, increasing a gain of the received signal before mixing if the gain of the received signal is below a gain threshold" in combination with the limitations of Claim 11. Claim 17 is thus patentably distinguished over Atkinson and Freed.

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### Allowability of Claim 19-21 & 25 Over Arpaia & Freed

#### Rejection Summary for Claims 19-21

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Claim 19 stand rejected under 35 USC 103 as being unpatentable over US Patent No. 6,192,225 (Arpaia). Claims 20 and 21 stand rejected under 35 USC 103 as being unpatentable over Arpaia in view of Freed.

The Examiner alleges specifically that it would have been obvious to ..

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#### Argument Supporting Patentability of Independent Claims 19 & 25

Regarding Claim 19, Arpaia fails to disclose or suggest a method in an RF receiver, comprising:

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... receiving a signal within a passband of a pre-selection filter of the receiver;

mixing the received signal at a mixer injection frequency outside the passband of the pre-selection filter;

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chopping the received signal before and after mixing at the same chopper frequency,

the chopper frequency proportional to the mixer injection frequency.

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Contrary to the Examiner's assertion, Arpaia does not mix the received signal with "... a mixer injection frequency outside the passband of the pre-selection filter..." In Arpaia the frequency  $f_0$  of the local oscillator (4) (mixer injection frequency) is the same as the received signal frequency.  
5 Arpaia, col. 4, lines 6-8. Thus in Arpaia, the frequency  $f_0$  of the local oscillator (4) must be within the passband of the preselector filter.

Arpaia reduces the spurious emission of oscillator leakage by modulating the local oscillator frequency with a switching oscillator (7). The modulation occurs in Arpaia at the phase change element (5). Arpaia, col. 4,  
10 line 58-62. In Arpaia, the frequency of the switching oscillator (7) is greater the bandwidth of the preselector filter. Arpaia, col. 4, lines 47-50 & lines 63- 67.

Arpaia also does not chop the received signal at a "... chopper frequency proportional to the mixer injection frequency." In Arpaia, the inverters 9, 9' "chop up" second order products by switching the polarity of  
15 the signal at the same rates as the switching oscillator (9). Arpaia, col. 4, lines 40-44.

Regarding new independent Claim 25, Arpaia fails to disclose or suggest a method in an RF receiver, comprising

20 ... receiving a signal within a passband of a pre-selection filter of the receiver;  
mixing the received signal at a mixer injection frequency outside the passband of the pre-selection filter;  
25 chopping the received signal at a chopper frequency proportional to the mixer injection frequency.

As noted above, in Arpaia, the switching oscillator frequency is greater than the bandwidth of the preselector filter, and chopping is performed at the same rate as the switching oscillator.



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Claims 19 and 25 and dependent Claims 20-21 are thus patentably distinguished over Arpaia.

Argument Supporting Patentability of Claim 20

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Regarding Claim 20, neither Arpaia nor Freed disclose or suggest "... increasing a gain of the received signal before mixing if the received signal gain is below a threshold" in combination with Claim 19. Claim 20 is thus patentably distinguished over the art.

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Argument Supporting Patentability of Claim 21

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Regarding Claim 21, neither Arpaia nor Freed disclose or suggest "... mixing the received signal at the mixer injection frequency outside the passband of the pre-selection filter when the measured gain is above a threshold, mixing the received signal at a mixer injection frequency within the passband of the pre-selection filter if the measured gain is below the threshold." The Examiner does not explicitly address the conditional mixing of the receive signal, which is not addressed by either prior art reference.

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Claim 20 is thus patentably distinguished over the art.

Allowability of Claims 22-23 Over Arpaia & Atkinson

Rejection Summary

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Claims 22 & 23 stand rejected Under 35 USC 103 as being unpatentable over US Patent No. 6,192,225 (Arpaia) in view of Atkinson. The Examiner alleges specifically that it would have been obvious to

5                   ... modify the teachings of Arpaia et al, with the teachings of Atkinson to specifically select a frequency divide ratio greater than or equal to one that would have maintained the local oscillator frequency outside the bandwidth of harmonics or  
10                   fundamental frequency of the received signal ...."

Argument Supporting Patentability of Independent Claim 22

As noted above, Atkinson multiplies the frequency  $F_3$  of the VCO 38 by a factor of  $4/3$ , which corresponds to a frequency divide ratio in Atkinson  
15                   that is  $< 1$ . See Atkinson, para. 0019. Also, Atkinson does not distinguish between a VCO having a frequency that is within or without the bandwidth of the received signal harmonics. Atkinson merely indicates that the frequency of the VCO is "... not harmonically related ... to the frequency of the input RF  
20                   signal." Thus there is no disclosure or suggestion in either Atkinson or Arpaia for a method in intermediate frequency and direct conversion receivers, comprising

25                   ... chopping a received signal;  
                  mixing the received signal after chopping at a mixer injection frequency;  
                  deriving the mixer injection frequency from a voltage controlled oscillator signal frequency outside a bandwidth of received signal harmonics.

30                   Claim 22 and dependent Claim 23 is thus patentably distinguished over Atkinson and Arpaia.

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Argument Supporting Patentability of Claim 23

Regarding Claim 23, contrary to the Examiner's assertion, neither Arpaia nor Atkinson disclose or suggest that the

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... providing the mixer injection frequency derived from a VCO frequency that is outside a bandwidth of the harmonics of the received signal by dividing a voltage controlled oscillator output by a frequency divide ratio,

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a harmonic of the received signal corresponding to the divide ratio of the frequency divider.

Neither Arpaia nor Atkinson disclose or suggest dividing a VCO output by a frequency divider that corresponds to a harmonic of the received signal. The Examiner's action does not specifically address the limitations of Claim 23. Claims 23 is thus patentably distinguished over the art.

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Prayer for Relief

In view of the amendments and the discussion above, the Claims of the present application are in condition for allowance. Kindly withdraw any rejections and objections and allow this application to issue as a United States Patent without further delay.

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The Applicant requests a telephone interview with the Examiner in connection with the present response. Kindly contact the undersigned upon carefully reviewing the foregoing amendment and discussion, prior to preparing an official action in response thereto.

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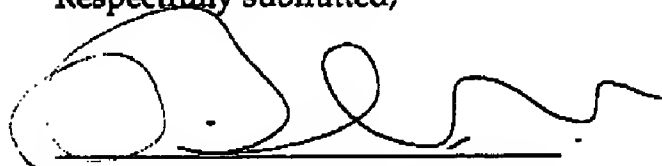
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Respectfully submitted,



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